

July, 12, 2000

VIA CERTIFIED MAIL Z 029 877 146

Larry Kraynik
Terminal Supervisor
Mobil Oil Corporation Hammond Terminal
1527 – 141st Street
Hammond, Indiana 46320

Re: First Minor Source Modification 089-12342 for Part 70 Permit # T089-7786-00233

Dear Mr. Kraynik:

Mobil Oil Corporation was issued a Part 70 operating permit (T089-7786-00233) on December 30, 1997 for a Petroleum Bulk Terminal. An application to modify the source was received on April 24, 2000. Pursuant to 326 IAC 2-7-10.5 (d)(6) the following emission unit is approved for construction or modification at the source:

Installation of internal float roof with mechanical shoe seal and rim-mounted secondary seal on existing Tank #115 with a change from distillate service to combined gasoline-distillate service.

The following construction conditions are applicable to the proposed project:

General Construction Conditions

1. The data and information supplied with the application shall be considered part of this source modification approval. Prior to any proposed change in construction which may affect the potential to emit (PTE) of the proposed project, the change must be approved by the Office of Air Management (OAM).
2. This approval to construct does not relieve the permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.
3. Effective Date of the Permit
Pursuant to IC 13-15-5-3, this approval becomes effective upon its issuance.
4. Pursuant to 326 IAC 2-1.1-9 and 326 IAC 2-7-10.5(i), the Commissioner may revoke this approval if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is suspended for a continuous period of one (1) year or more.
5. All requirements and conditions of this construction approval shall remain in effect unless modified in a manner consistent with procedures established pursuant to 326 IAC 2.

6. Pursuant to 326 IAC 2-7-10.5 (l) the emission units constructed under this approval shall not be placed into operation prior to revision of the source's Part 70 Operating Permit to incorporate the required operation conditions.

The proposed operating conditions for these emission units are attached to this minor source modification approval. These proposed operating conditions shall be incorporated into the Part 70 operating permit as a minor permit modification (089-**12382**) in accordance with 326 IAC 2-7-12 (b)(1)(E).

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter call (219) 853-6306 and ask for Ronald Holder or Debra Malone.

Sincerely,

Ronald L. Novak, Director
Hammond Department of Environmental Management
Air Pollution Control Division

Attachments

RH

cc: File - Lake County
U.S. EPA, Region V - Cheryl Newton
Permits Administration - Mindy Hahn

PART 70 OPERATING PERMIT

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
and
HAMMOND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
AIR POLLUTION CONTROL DIVISION**

**Mobil Oil Corporation
1527 - 141st Street
Hammond, Indiana 46320**

(herein known as the Permittee) is hereby authorized to operate subject to the conditions contained herein, the source described in Section A (Source Summary) of this permit.

This permit is issued in accordance with 326 IAC 2 and 40 CFR Part 70 Appendix A and contains the conditions and provisions specified in 326 IAC 2-7 and 326 IAC 2-1-3.2 as required by 42 U.S.C. 7401, et. seq. (Clean Air Act as amended by the 1990 Clean Air Act Amendments), 40 CFR Part 70.6, IC 13-15 and IC 13-17.

Operation Permit No.: T089-7786-00233	
Original Issued By: Felicia R. George, Assistant Commissioner Office of Air Management	Issuance Date: December 30, 1997

First Administrative Permit Amendment.: AT089-9895-00233 issued August 14, 1998.

First Minor Source Modification: 089-12342-0233	Pages Affected: 35, 36, and 37
Issued by: _____ Ronald L. Novak, Director Hammond Department of Environmental Management	Issuance Date: July 12, 2000

Hammond Department of Environmental Management (HDEM)
- Air Pollution Control Division -
and
Indiana Department of Environmental Management (IDEM)
Office of Air Management

Technical Support Document (TSD) for a Minor Source Modification
and a Minor Permit Modification to a Part 70 Permit

Source Background and Description

Source Name:	Mobil Oil Corporation	Part 70 Permit:	T089-7786-00233
Source Location:	1527 – 141 st Street, Hammond		
County:	LAKE		
Minor Source Modification:	089-12342-00233		
Minor Permit Modification:	089-12382-00233		
SIC Code:	5171 - Petroleum Bulk Station, Terminal		
Permit Reviewer:	Ronald Holder		

The Hammond Department of Environmental Management (HDEM) has reviewed an application from Mobil Oil Corporation relating to the installation of an internal floating roof including a mechanical shoe seal and rim-mounted secondary seal for Petroleum Liquid Storage Tank #115 at the above Hammond location.

The modification will qualify the tank for gasoline storage and New Source Performance Standards (NSPS) 40 CFR 60, Subpart Kb, for Volatile Organic Liquid Storage Vessels. A minor source modification will be required per 326 IAC 2-7-10.5 (d)(6). A minor permit modification will be issued per 326 IAC 2-7-12 (b)(1)(E) because the required reporting and record keeping per NSPS is not considered a modification under Title I of the CAA.

The minor permit revision will consist of replacing Tank 159 in Section D.3 of the Part 70 Permit. Section D.3 was the construction and operation conditions for Tank 159 which Mobil does not plan to build (see attached facsimile). Section D.3, which contains the federal requirements for new and modified petroleum tanks, will become the facility operation conditions section for the converted Tank 115.

Stack Summary

Stack ID	Operation	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (°F)
Tank #115	Gasoline storage	40	90	N/A	ambient

Recommendation

The staff recommends to the Director that the construction and operation be approved. This recommendation is based on the following facts and conditions:

Information, unless otherwise stated, used in this review is derived from the application and additional information submitted by the applicant. A complete application for the purpose of this review was received on April 24, 2000.

Emissions Calculations

See Appendix A (Emissions Calculation Spreadsheets) for detailed calculations (three (3) pages).

Total Potential and Allowable Emissions (before installation of internal float roof and seals (distillate service))

Pollutant	Allowable Emissions		Potential Emissions	
	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)
PM	0	0	0	0
SO ₂	0	0	0	0
VOC	2.32	0.42	2.32	0.42
CO	0	0	0	0
NOx	0	0	0	0
Single HAP	0.62	0.11	0.62	0.11
Combination of HAPs	1.41	0.26	1.41	0.26

HAPs are based on application - change in tank service from distillates to gasoline results in a reduction of HAP emissions.

Total Potential and Allowable Emissions (after installation of internal float roof and seals (gasoline service))

Pollutant	Allowable Emissions		Potential Emissions	
	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)
PM	0	0	0	0
SO ₂	0	0	0	0
VOC	15.89	2.90	15.89	2.90
CO	0	0	0	0
NOx	0	0	0	0
Single HAP	0.25	0.05	0.25	0.05
Combination of HAPs	0.68	0.12	0.68	0.12

HAPs are based on application - change in tank service from distillates to gasoline results in a reduction of HAP emissions.

The potential emissions increase due to the installation of the internal float roof and seals is:

VOC	13.57 lb/day	2.48 ton/yr
------------	---------------------	--------------------

The resultant increase in emissions is less than ten (10) tons per year and less than fifteen (15) pounds per day. Therefore 326 IAC 2-7-10.5 (d)(10) and (d)(4)(B) for minor source modifications do not apply. However, the conversion of this tank will subject the tank to New Source Performance Standard (NSPS), 40 CFR 60, Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels. Therefore, a minor source modification is required per 326 IAC 2-7-10.5 (d)(6).

For those modifications involving NSPS where the only applicable requirements are ongoing reporting or record keeping, a minor permit modification is required under 326 IAC 2-7-12 (b)(1)(E) because this type of NSPS change is not considered by the EPA to be a Title I modification.

County Attainment Status

Volatile organic compounds (VOC) and oxides of nitrogen are precursors for the formation of ozone. Therefore, VOC and NO_x emissions are considered when evaluating the rule applicability relating to the ozone standards. Lake County has been designated as severe nonattainment for ozone. Therefore, VOC and NO_x emissions were reviewed pursuant to the requirements for Emission Offset, 326 IAC 2-3.

Mobil Oil Corporation is a major stationary source for the purpose of 326 IAC 2-3 (Emission Offset) because they are located in Lake County (severe ozone nonattainment) and have the potential to emit greater than twenty-five (25) tons per year of volatile organic compounds.

The emissions increase from this modification is less than twenty-five (25) tons per year (de minimis) when aggregated on a pollutant specific basis with all other net emissions increases from the source over a five (5) consecutive calendar year period. See calculations (Appendix A) Contemporaneous Increases. Therefore, pursuant to 326 IAC 2-3-2 (b)(1) (Applicability) Emission Offset requirements do not apply.

Part 70 Permit Determination

326 IAC 2-7 (Part 70 Permit Program)

This existing source submitted their Part 70 (T-089-7786-00233) application on December 16, 1996. The permit was issued on December 30, 1997. The Title V Permit will be modified according to 326 IAC 2-7-12 (b)(1)(E), Minor permit modification.

This status is based on all the air approvals issued to the source. This status has been verified by the HDEM.

Federal Rule Applicability

Existing Volatile Organic Liquid Storage Vessel (Tank 115) will now be subject to the New Source Performance Standards (NSPS) in 326 IAC 12, (40 CFR 60.112b, Subpart (Kb).

- a) This rule requires that volatile organic liquid storage vessels with a capacity equal to or greater than 151 cubic meters (39,000 gallons) containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 5.2 kPa (0.75 psi) but less than 76.6 kPa (11 psi), shall be equipped with an internal floating roof with appropriate primary and/or secondary seals.
- b) Mobil Oil Corporation is adding an internal floating roof with mechanical shoe seal and rim-mounted secondary seal to Tank 115 in order to service gasoline. They have acknowledged the requirements in their request for this modification. Tank 115 will be subject to the reporting and record keeping requirements of 40 CFR 60.115b and the monitoring requirements of 40 CFR 60.116b.

State Rule Applicability

326 IAC 2-6 (Emission Reporting)

This facility is subject to 326 IAC 2-6 (Emission Reporting), because the source emits more than 10 tons/yr of VOC in Lake County. Pursuant to this rule, the owner/operator of this facility must annually submit an emission statement of the facility. The annual statement must be received by April 15 of each year and must contain the minimum requirements as specified in 326 IAC 2-6-4.

Mobil Oil Corporation submits an annual emission statement that includes all volatile organic liquid storage tanks.

State Rule Applicability (continued)

326 IAC 8-4-3 (Petroleum Liquid Storage Facilities)

326 IAC 8-4-1 (c) exempts this vessel from the standards and requirements in 326 IAC 8-4-3 (b) and (d) because Mobil Oil Corporation and Tank #115 are not new sources. However, the standards and requirements of this rule are met by compliance with the New Source Performance Standards.

326 IAC 8-9 (Volatile Organic Liquid Storage Vessels)

326 IAC 8-9-2 (8) exempts this vessel from the standards and requirements in 326 IAC 8-9 because the vessel is subject to 40 CFR 60, Subpart Kb, New Source Performance Standards for Volatile Organic Liquid Storage.

Air Toxic Emissions

Indiana presently requests applicants to provide information on emissions of the 188 hazardous air pollutants set out in the Clean Air Act Amendments of 1990. These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industries. They are listed as air toxics on the Office of Air Management (OAM) Construction Permit Application Form Y.

Although there are air toxics associated with the storage of gasoline, there will be a decrease of air toxic emissions due to the conversion of this tank from distillate service to gasoline service. Mobil Oil Corporation submits this information with their annual emission statement.

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants)

326 IAC 2-4.1-1 (New source toxics control) does not apply to the addition of this internal float pan to Tank 115 because this is not a construction or reconstruction of a major source of HAPs as defined in 40 CFR 63.41. Also, this addition to Tank 115 does not result in an increase of ten (10) tons per year of a single HAP or twenty-five (25) tons per year of a combination of HAPs. However, the addition of an internal float roof with a mechanical shoe seal and rim-mounted secondary seal would be generally accepted as the maximum achievable control technology, MACT, for hazardous air pollutant emissions from the storage of gasoline.

Conclusion

The conversion / modification of Tank #115 by the addition of an internal float roof including mechanical shoe seal and rim-mounted secondary seal will be subject to the conditions of the attached proposed **Minor Source Modification 089-12342-00233 and Minor Permit Modification 089-12382-00233.**

The minor permit revision will consist of replacing Tank 159 in Section D.3 of the current Part 70 Permit. Section D.3 was the construction and operation conditions for Tank 159 which Mobil does not plan to build (see attached facsimile). In Section D.3, the construction conditions section for Tank 159 will be removed and the existing operation conditions section, which contains the federal requirements for gasoline storage tanks, will become the facility operation conditions section for the converted Tank 115.

Proposed Changes:

The following changes were agreed to and made as the first minor permit modification for this source (~~strikeout~~ added to show what was deleted and **bold** added to show what was added):

1. In the Table of Contents (page 4 of 44), Section D.3 changes as follows to add the modified Tank 115 and Section D.4 changes to delete Tank 115:

D.3	FACILITY CONDITIONS - Storage Tank No. 159 115	35
D.3.1	General Construction Conditions	35
D.3.2	Effective Date of the Permit	35
D.3.3	First Time Operation Permit	35
D.3.4	Emission Limitations and Standards [326 IAC 2-7-5(1)]	36
	Emission Limitations and Standards [326 IAC 2-7-5(1)]	
D.3.1	Volatile Organic Compounds (VOC)	35
D.3.2	Preventive Maintenance Plan [326 IAC 2-7-5(13)]	35
	Compliance Determination Requirements	
D.3.5 D.3.3	Testing Requirements [326 IAC 2-7-6(1)]	36 35
D.3.4	Monitoring – Testing and Procedures Equipment (Visual Inspection, Repair, & Notification)	35
	Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]	
D.3.6	Monitoring Testing and Procedures Equipment (Visual Inspection, Repair, & Notification)	36
D.3.5	Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]	36
	Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]	
D.3.7 D.3.6	Record Keeping and Reporting Requirements (Tank Inspections)	36
D.3.8 D.3.7	Record Keeping and Reporting Requirements (Product Storage)	37
D.3.9 D.3.8	Reporting Requirements	37
D.4	FACILITY OPERATION CONDITIONS Four (4) Three (3) fixed cone Storage Tanks No. 115 , 152, 153, & 37	

2. In Section A, Source Summary, (page 6 of 44), Section A.2 (3) has been changed as follows to replace Tank 159 with the modified Tank 115:

- (3) One (1) petroleum liquid storage tank identified as Storage Tank No. ~~159~~ **115** with the following specifications:
 - (a) Storage Tank No. ~~159~~ **115** is used to store petroleum products with a maximum true vapor pressure of 9.4 psia at 68°F (**gasoline or distillates**). The tank has an internal floating roof equipped with a ~~Liquid Mounted Primary~~ **mechanical shoe seal** and Rim Mounted Secondary seal. The maximum design capacity of the tank is ~~2,520,000~~ **1,617,924** gallons.

3. In Section A, Source Summary, (page 6 of 44), Section A.3 (7) has been changed as follows to remove Tank 115 and re-numerate the remaining tank descriptions.

- ~~a)~~ a) Storage Tank No. 115 is used to store No. 1 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 1,890,000 gallons.
 - ~~b)~~ a) Storage Tank No. 152 is used to store No. 2 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.
 - ~~c)~~ b) Storage Tank No. 153 is used to store Diesel RM Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.
 - ~~d)~~ c) Storage Tank No. 37 is used to store Waste Water with a maximum true vapor pressure of less than 0.75 psia at 60°F. This tank has a fixed cone roof and a maximum design capacity 95,340 gallons.
-

4. In Section A, Source Summary, (page 7 of 44), the remaining items in Section A.3 (7) are re-numerated as follows:

- ~~e)~~ d) Storage Tank Nos. 157 and 158 are used to store Distillates with a maximum true vapor pressure of less than 0.1 psia at 68°F. These tanks each have a fixed-cone roof and a maximum design capacity of 2,520,000 gallons.
 - ~~f)~~ e) Eight (8) Storage Vessels:
 - ~~g)~~ f) Six (6) Underground Storage Tanks:
-

5. In Section D.3, Facility Conditions, the facility conditions description box has been changed as follows to replace Tank 159 with the modified Tank 115:

- (3) One (1) petroleum liquid storage tank identified as Storage Tank No. ~~159~~ 115 with the following specifications:
- (a) Storage Tank No. ~~159~~ 115 is used to store petroleum products with a maximum true vapor pressure of 9.4 psia at 68°F (gasoline or distillates). The tank is equipped with an internal floating roof equipped with a Liquid Mounted Primary which has a mechanical shoe seal and Rim Mounted Secondary seal. The maximum design capacity of the tank is ~~2,520,000~~ 1,617,924 gallons.

6. In Section D.3, Facility Conditions, the following Construction Conditions for Tank 159 have been removed because Mobil Corporation's Hammond Terminal has indefinitely postponed their plans to build Tank 159 and the allotted construction period has expired.

~~THIS SECTION OF THE PERMIT IS BEING ISSUED UNDER THE PROVISIONS OF 326 IAC 2-1 AND 40 CFR 52.780, WITH CONDITIONS LISTED BELOW.~~

~~Construction Conditions [326 IAC 2-1-3.2]~~

~~General Construction Conditions~~

~~D.3.1 This permit to construct does not relieve the Permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.~~

~~Effective Date of the Permit~~

~~D.3.2 Pursuant to IC 13-15-5-3, this section of this permit becomes effective upon its issuance.~~

~~First Time Operation Permit~~

~~D.3.3 This document shall also become the first time operation permit for the facilities under this section of this permit, pursuant to 326 IAC 2-1-4 (Operating Permits) when, prior to start of operation, the following requirements are met:~~

~~_____ (a) The attached affidavit of construction shall be submitted to:~~

~~_____ Indiana Department of Environmental Management
_____ Permit Administration & Development Section, Office of Air Management
_____ 100 North Senate Avenue, P.O. Box 6015
_____ Indianapolis, Indiana 46206-6015~~

~~_____ and to:~~

~~_____ Hammond Department of Environmental Management
_____ Air Pollution Control Division
_____ 5925 Calumet Avenue Room 304
_____ Hammond, Indiana 46320~~

~~verifying that the facilities were constructed as proposed in the application. The facilities covered in this section of this permit may begin operating on the date the Affidavit of Construction is postmarked or hand delivered to HDEM.~~

~~(b) If construction is completed in phases; i.e., the entire construction is not done continuously, a separate affidavit must be submitted for each phase of construction. Any permit conditions associated with operation start-up dates such as stack testing for New Source Performance Standards (NSPS) shall be applicable to each individual phase.~~

~~(c) The permittee shall receive an Operation Permit Validation Letter from the Hammond Department of Environmental Management and attach it to this permit.~~

7. In Section D.3, Facility Conditions, the remaining existing operation conditions for Tank 159 are unchanged and moved forward in the document to become the operation conditions for Tank 115. Pages 35, 36, and 37 are affected by the above removal of the construction conditions for Tank 159 and re-positioning of the operation conditions for Tank 115.

8. In Section D.4, Facility Operation Conditions – Insignificant Activities, Tank 115 is removed from the facility description box as follows:

- (7) ~~Four (4)~~ **Three (3)** fixed cone Storage Tank Nos. ~~115~~, 152, 153 and 37 with the following specifications:
- ~~a)~~ **a)** Storage Tank No. 115 is used to store No. 1 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 1,890,000 gallons.
 - ~~b)~~ **a)** Storage Tank No. 152 is used to store No. 2 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.
 - ~~c)~~ **b)** Storage Tank No. 153 is used to store Diesel RM Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.
 - ~~d)~~ **c)** Storage Tank No. 37 is used to store Waste Water with a true vapor pressure of less than 0.75 psia at 60°F. This tank has a fixed cone roof and a maximum design capacity 95,340 gallons.

The conversion / modification of Tank #115 by the addition of an internal float roof including mechanical shoe seal and rim-mounted secondary seal will be subject to the conditions of the attached proposed **Minor Source Modification 089-12342-00233 and Minor Permit Modification 089-12382-00233.**

Calculations for addition of internal float pan to fixed cone roof tank 115.

Potentials before and after the addition of an internal float pan to fixed cone tank 115.

Although an internal float roof does reduce emissions, adding the float roof with rim seals will qualify the tank to store gasoline which is more volatile and has a higher emission factor than petroleum liquids currently allowed in fixed cone roof tanks.

Therefore, the before and after potentials will be based on the difference between an internal float roof tank with gasoline and a fixed cone tank with distillate fuel oil.

Enter tank capacities and expected throughputs. Emission Factor (EF) will change with product. EF/1000 can be derived from previous emission statements or other like tanks at other sources. EF/1000 can also be determined from AP42 or TANKS Program 4.0 which is approved by EPA.

After addition of internal float pan:

Tank #	Type	Product	Capacity	Thruput	SCC #	EF/1000	T/yr
115	IF	gasoline	1,617,924		4-04-001-12	3.600	2.912
				50,000,000	4-04-001-16	0.002	0.050
Total						2.962 TPY	

Before addition of internal float pan:

115	FC	distillate fuel oil	1,617,924		4-03-010-16	0.4400	0.3559
				25,000,000	4-03-010-18	0.0300	0.3750
Total						0.731 TPY	

Increase in potential emissions due to the addition of an internal float pan: 2.231 TPY

This is another method of calculating the increase of potential emissions due to the conversion of a fixed cone roof tank to an internal float roof tank. These calculations were used to check the previous calculations.

RH/06/01/00

Mobil Oil Corporation - Hammond Terminal

* Contemporaneous Increases per 326 IAC 2-3-1 (t)

[illegible]

Totals:

0

0

2.01

0

0

0

0

0

* "Net Emissions Increase" definition in 326 IAC 2-3-1 (t)

to determine applicability to Emission Offset Rule 326 IAC 2-3.

Hammond Department of Environmental Management
Emission Inventory System Update (EIS)
Storage of Organic Liquids ... AP-42 ... Section 7

Tank 115 - Proposed Service - Internal Float Roof Tank with Gasoline

General Information:

Company Name
Year of Data
Plant ID #

Mobil Oil Corp
Hammond
review
089-0233

Tank Information:

Tank ID #
Tank Shell Diameter.....
Tank Shell Height.....
*Tank Shell Type (Welded or Riveted).....
*Tank Deck Type (Welded or Bolted).....
*Tank Rim Seal Type.....
Tank Capacity (max liquid).....

115	
90	feet
40	feet
Welded	
Welded	
Mechanical Shoe w Rim-mtd Secondary	
1,617,924	gallons

Product Information: **

Product Stored.....
Vapor Molecular Weight.....
True Vapor Pressure @ 60° F.....
Average Organic Liquid Density.....
Annual Product Throughput.....

gas	
62.00	lb/lb-mole
5.816	psia - @ 60° F
5.60	lb/gal
50,000,000	gallons/yr

*if this information changes, see calculations

if tank contains crude oil, see calculations

**This product information available in the AP-42, Section 7.

Lr =	Rim Seal Loss =	0.210	Tons/yr
Lwd =	Withdrawal Loss =	0.056	Tons/yr
Lf =	Deck Fitting Losses =	2.634	Tons/yr
Ld =	Deck Seam Loss =	0.000	Tons/yr

Lt = Lr + Lwd + Lf = Total Loss =	2.900	Tons/yr
-----------------------------------	-------	---------

RH/06/01/00

See AP-42, Section 7, for clarification of the following calculations:

* asterisked items change with rim seal information (see AP-42, Section 7)

Rim Seal Loss:

* Kr = seal factor (this seal factor from TANKS 4.0) =	0.6 lb-mole/ft•yr
P* = vapor pres. function - Equation (3-3) =	0.125243 dimensionless
D = tank diameter =	90 feet
Mv = vapor molecular weight (Table 7.1-3)	62.00 lb/lb-mole
crude? Kc = product factor, Kc = 0.4 for crude oils,	1.0
Kc = 1 for all other organic liquids	

$$L_r = \text{Rim Seal Loss} = (K_r) * (P^*) * (D) * (M_v) * (K_c) = 419.315 \text{ lb/yr}$$

Withdrawal Loss:

Q = annual throughput, (42 gal/bbl) =	1190476 bbl/yr
WL = ave. organic liquid density (Table 7.1-3) =	5.6 lb/gal
D = tank diameter =	90 feet
Nc = number of columns =	6
C = shell clingage factor, (see Table 7.1-10) =	0.0015 bbl/1000 sqft
C = 0.006 for crude oil	

Lwd =

$$\text{Withdrawal Loss} = (0.943 * Q * C * WL / D) (1 + N_c / D) = 111.763 \text{ lb/yr}$$

Deck Fitting Loss:

Ff = total deck fitting loss factor (Table 7.1-16) =	678.5 lb-mole/yr
(go to cell G47)	
P*, Mv, and Kc as defined in above calculations	

$$L_f = \text{Deck Fitting Losses} = (F_f) * (P^*) * (M_v) * (K_c) = 5268.616 \text{ lb/yr}$$

Deck Seam Loss:

Kd = deck seam loss per unit seam length factor =	0.00 lb/mole/ft-yr
(0.0 for welded deck, 0.34 for bolted deck)	
Sd = deck seam length factor =	0.2 ft/sqft
D, P*, Mv, and Kc are as defined above	

Ld =

$$\text{Deck Seam Loss} = (K_d) * (S_d) * (D^2) * (P^*) * (M_v) * (K_c) = 0.000 \text{ lb/yr}$$

Tanks with welded decks do not have deck seam losses

The End

Kr

VMP = 6.7

LMP = 3.0

VMP w/sec = 2.5

LMP w/sec = 1.6

MechShoe = 0.6 (Tanks 4.0)

Summary of Internal Float Roof Tank Deck Fitting Loss Factors
for typical numbers based on tank diameter, see AP-42, Table 7.1-16
if tank-specific data is unavailable use Figures 7.1-24 and 25

Deck Fitting Type	Quantity	Factor	Total
Access Hatch:			
Bolted Cover, Gasketed.....	0	1.6	0
Unbolted Cover, Gasketed.....	0	11	0
Unbolted Cover, Ungasketed.....	1	25	25
Automatic Gauge Float Well:			
Bolted Cover, Gasketed.....	0	5.1	0
Unbolted Cover, Gasketed.....	0	15	0
Unbolted Cover, Ungasketed.....	1	28	28
Column Well:			
Builtup Column - Sliding cover, Gasketed.....	0	33	0
Builtup Column - Sliding Cover, Ungasketed.....	6	47	282
Pipe Column - Flexible Fabric Sleeve Seal.....	0	10	0
Pipe Column - Sliding Cover, Gasketed.....	0	19	0
Pipe Column - Sliding Cover, Ungasketed.....	0	32	0
Ladder Well:			
Sliding Cover, Gasketed.....	0	56	0
Sliding Cover, Ungasketed.....	1	76	76
Roof Leg or Hanger Well:			
Adjustable.....	28	7.9	221.2
Fixed.....	0	0	0
Sample Pipe or Well:			
Slotted Pipe - Sliding Cover, Gasketed.....	0	44	0
Slotted Pipe - Sliding Cover, Ungasketed.....	0	57	0
Sample Well - Slit Fabric Seal, (10% open area).....	1	12	12
Stub Drain, 1" diameter.....	28	1.2	33.6
Vacuum Breaker:			
Weighted Mechanical Actuation, Gasketed.....	1	0.7	0.7
Weighted Mechanical Actuation, Ungasketed.....	0	0.9	0
Total Deck Fitting Loss Factor (Ff) =			678.5

Hammond Department of Environmental Management Emission Inventory System Update (EIS) Storage of Organic Liquids ... AP-42 ... Section 7
--

Tank 115 - Current Service - Vertical Fixed Roof Tank with Fuel Oil #2

General Information:

Company Name	Mobil Oil Corp
Year of Data	Hammond
Plant ID #	review
	089-0233

Tank Information:

Tank ID #	115
Tank Shell Diameter.....	90 feet
Tank Shell Height.....	40 feet
Tank Capacity (max liquid).....	1,617,924 gallons

Product Information:

Product Stored.....	Distillate Fuel Oil #2
*Vapor Molecular Weight.....	130.0 lb/lb-mole
*True Vapor Pressure @ 60° F.....	0.0074 psia - @ 60° F
*True Vapor Pressure @ 40° F.....	0.0031 psia - @ 40° F
Annual Product Throughput.....	24,268,860 gallons/yr
Average Annual Liquid Height.....	20 feet
(If unknown, use half of tank shell height.)	

*This product information available in the AP-42, Section 7.

*if tank is not white, or if it contains crude oils - see calculations

Ls = Standing Storage Losses =	0.1452	Tons/yr
Lw = Working Losses =	0.2779	Tons/yr

Lt = Ls + Lw = Total Losses =	0.4231	Tons/yr
-------------------------------	--------	---------

Appendix A

See AP-42, Section 7, for clarification of the following calculations:

$$L_s = \text{Standing Storage Losses} = 365 \cdot (V_v) \cdot (W_v) \cdot (K_e) \cdot (K_s)$$

$$H_r = \text{tank roof height} = S_r \cdot R_s = 0.0625 \cdot (D/2) = 2.813 \text{ feet}$$

$$H_{ro} = \text{roof outage} = H_r/3 = 0.938 \text{ feet}$$

$$H_l = \text{liquid height (1/2 tank height if unknown)} = 20.000 \text{ feet}$$

$$H_s = \text{tank shell height} = 40.000 \text{ feet}$$

$$H_{vo} = \text{vapor space outage} = H_s - H_l + H_{ro} = 20.938 \text{ feet}$$

$$D = \text{tank diameter} = 90.000 \text{ feet}$$

$$V_v = \text{Tank Vapor Space Volume} = (\pi/4) \cdot (D^2) \cdot (H_{vo}) = \underline{133198.620 \text{ cft}}$$

$$M_v = \text{vapor molecular weight (Tables 7.1-2 \& 3)} = 130.0 \text{ lb/lb-mole}$$

$$P_{va} = \text{vapor pressure at } T_{La} \text{ (Tables 7.1-2 \& 3)} = 0.0074 \text{ psia @ 50-60}^\circ\text{F}$$

$$T_{La} = \text{daily average liquid surface temperature}^\circ\text{R} = 510.843 \text{ }^\circ\text{R}$$

as calculated for Chicago area using AP-42, Section 7

$$W_v = \text{Vapor Density} = (M_v \cdot P_{va}) / (10.731 \cdot T_{La}) = \underline{0.0001755 \text{ lb/cft}}$$

$$T_a = \text{daily ambient temp range (Chgo area)} = 19.00 \text{ }^\circ\text{R}$$

$$= \text{tank paint solar absorptance (Table 7.1-7)} = 0.17 \text{ dimensionless}$$

*(this factor (α) will change for non-white tanks)

$$I = \text{daily total solar insolation factor (Chgo)} = 1215 \text{ Btu/sqft} \cdot \text{day}$$

$$T_v = \text{daily vapor temp range} =$$

$$= 0.72 \cdot (T_a) + 0.028 \cdot (I) = 19.4634 \text{ }^\circ\text{R}$$

$$T_{La} = \text{daily average liquid surface temp }^\circ\text{R} = 510.843 \text{ }^\circ\text{R}$$

$$P_v = \text{daily vpr pres range} = P_{v@60} - P_{v@40} = 0.0043 \text{ psia}$$

$$P_b = \text{breather vent pressure setting range} = 0.06 \text{ psig}$$

$$P_a = \text{atmospheric pressure} = 14.7 \text{ psia}$$

$$P_{va} = \text{vapor pressure at } T_{La} \text{ (Tables 7.1-2 \& 3)} = 0.0074 \text{ psia}$$

$$K_e = \text{Vapor Space Expansion Factor} =$$

$$(\Delta T_v / T_{La}) + (\Delta P_v - \Delta P_b) / (P_a - P_{va}) = \underline{0.034310 \text{ dimensionless}}$$

$$K_s = \text{Vented Vapor Saturation Factor} =$$

$$1 / (1 + 0.053 \cdot P_{va} \cdot H_{vo}) = \underline{0.991855 \text{ dimensionless}}$$

$$L_s = \text{Standing Storage Losses, lb/yr}$$

$$L_s = 365 \cdot (V_v) \cdot (W_v) \cdot (K_e) \cdot (K_s)$$

$$\underline{L_s = 290.337 \text{ lb/yr}}$$

Appendix A

See AP-42, Section 7, for clarification of the following calculations:

$$Lw = \text{Working Losses} = 0.0010 * (Mv) * (Pva) * (Q) * (Kn) * (Kp)$$

Q = annual net thruput, bbl/yr - (42 gal/bbl) =	577,830.0 bbl/yr
VLx = tank max liquid volume - (7.481 gal/cft)	216,271.1 cft
N = # of turnovers per year = $5.614 * Q / VLx$ =	15.0 dimensionless
Kn = turnover factor, =1 unless $N > 36$	1.0000 dimensionless
Kp = working loss product factor =	1.00 dimensionless
* Kp = 0.75 for crude oils,	
1.0 for all other products	

Lw = Working Losses, lb/yr

$$Lw = 0.0010 * (Mv) * (Pva) * (Q) * (Kn) * (Kp)$$

$$Lw = 555.872 \text{ lb/yr}$$

The End